Elkhorn Mountains Elk Project
2017 Annual Report

Background

In collaboration with the Elkhorn Working Group, Helena National Forest, Montana State University, and Montana Department of Military Affairs, Montana Fish, Wildlife & Parks initiated a study to evaluate the impact of mountain pine beetle (MPB) infestation on elk habitat and elk movements in the Elkhorn Mountains in January 2015. Management agencies as well as communities adjacent to forests impacted by these infestations are working to develop strategies to manage impacted forests and mitigate potential impacts to wildlife. This report summarizes project activities through April 2017.

Elk Diet Sampling & Vegetation Monitoring

To evaluate the forage quality and abundance within the Elkhorn Mountains study area, we initiated a 2-year vegetation sampling program in summer 2016. We sampled vegetation at 158 sites distributed across 8 different landcover classes from mid-July through the end of August (Figure 1). Sampling sites occurred on both public and private land. At each sampling site, we recorded the species composition, dominant phenological stage of each species (newly emergent, fruiting, flowering, mature, or senescent), and percent species cover at 5 $1m^2$ quadrats spaced along a 40 m transect at 10 m intervals. At the 0 m, 20 m, and 40 m quadrat, we established a nested 0.25 m^2 clip plot and collected all graminoid and forb biomass > 1 cm above ground. On shrubs, we clipped all leaves and non-woody stems (however, see changes to sampling methods below). We dried samples at 50°C in a drying oven for 48 hours and measured dry weight (i.e. plant biomass). We will be continuing our vegetation sampling for a second and final field season during the summer of 2017.

To identify the forage species in the summer and winter elk diet, we collected fecal pellets and had pellet samples analyzed for fecal plant fragments to identify the key elk forage species. We have completed our collections of 12 elk fecal pellet samples from 2 summer seasons (June - August) and 12 samples from 2 winter seasons (December- March). The pellet samples have been sent to the Washington State University Habitat and Nutrition Lab for diet analyses. To date, we have received the summer 2015 summer diet results. The summer diet consisted

of 65% graminoids, 28% forbs, 4% shrubs, and 3% trees, lichen or moss. Dominant graminoids in the summer diet included *Poa sp*., *Festuca idahoensis*, *Festuca campestris*, and *Carex* sp., the dominant forb was *Lupinus* sp., and the dominant shrub was *Vaccinium* sp. The forage species identified in the elk diet will be used with the survey data to estimate forage plant distribution across the study area.

To estimate the quality of forage plant species, we collected samples of forage species during each phenological stage and estimated dry matter digestibility using sequential detergent fiber analysis (Van Soest 1982) and an equation developed for wild ungulates (Robbins et al. 1987a, 1987b, Hanley et al. 1992). We then converted dry matter digestibility values to digestible energy (DE, Cook et al. 2016) measured as kcal/g. From an elk nutritional standpoint, DE $\geq$ 2.75 kcal/g is predicted to result in little to no nutritional limitation to reproduction and survival, DE 2.40–2.74 kcal/g is predicted to result in limitation to reproductive performance and DE $\leq$ 2.39 is predicted to result in significant limitations on reproductive performance and survival (Cook et al. 2004; 2016). We will be collecting composite samples of 5 individual plants per forage species in each of the 5 phenological stages during 2017 and estimating DE of these forage plants

Elk Survival & Seasonal Movements

In March 2017, we captured and collared 6 female and 8 male elk to increase sample size. We are currently monitoring the location and survival of 24 female and 12 male elk. Since the start of monitoring in February 2015, we have had 12 cases of collar failure and recorded 12 mortalities. Causes of mortality include harvest, mountain lion predation, natural causes, train collision and wounding loss (Table 2).

Cause	Female	Male
Harvest	4	2
Mountain Lion	2	0
Natural	1	1
Train	1	0
Archery Wounding Loss	0	1

Table 2. The cause of death for collared female and male elk from Feb. 2015 - present.

No elk have made long distance movements or emigrated from the Elkhorn Mountains area. However, a single bull elk left the study area near White Earth campground and swam to the eastern shore of Canyon Ferry Reservoir in early October. The bull remained east of Highway 284 until general season started, when he swam back to the west side of Canyon Ferry. Maps displaying seasonal distributions can be seen in figures 2 and 3.

Acknowledgements

We thank the Elkhorn Working Group and project collaborators for their help in developing and implementing this project. We thank Montana Fish, Wildlife and Parks, the United States Forest Service, the Montana Department of Military Affairs, Rocky Mountain Elk Foundation and Cinnabar Foundation for funding to support this work. We thank the landowners that have allowed access for fieldwork. We thank our seasonal technicians; Joe Capella and Blake Hoffman. We thank all the USFS personnel for help with logistics, access, and field work. We also thank FWP personnel for their help with capture operations and support.

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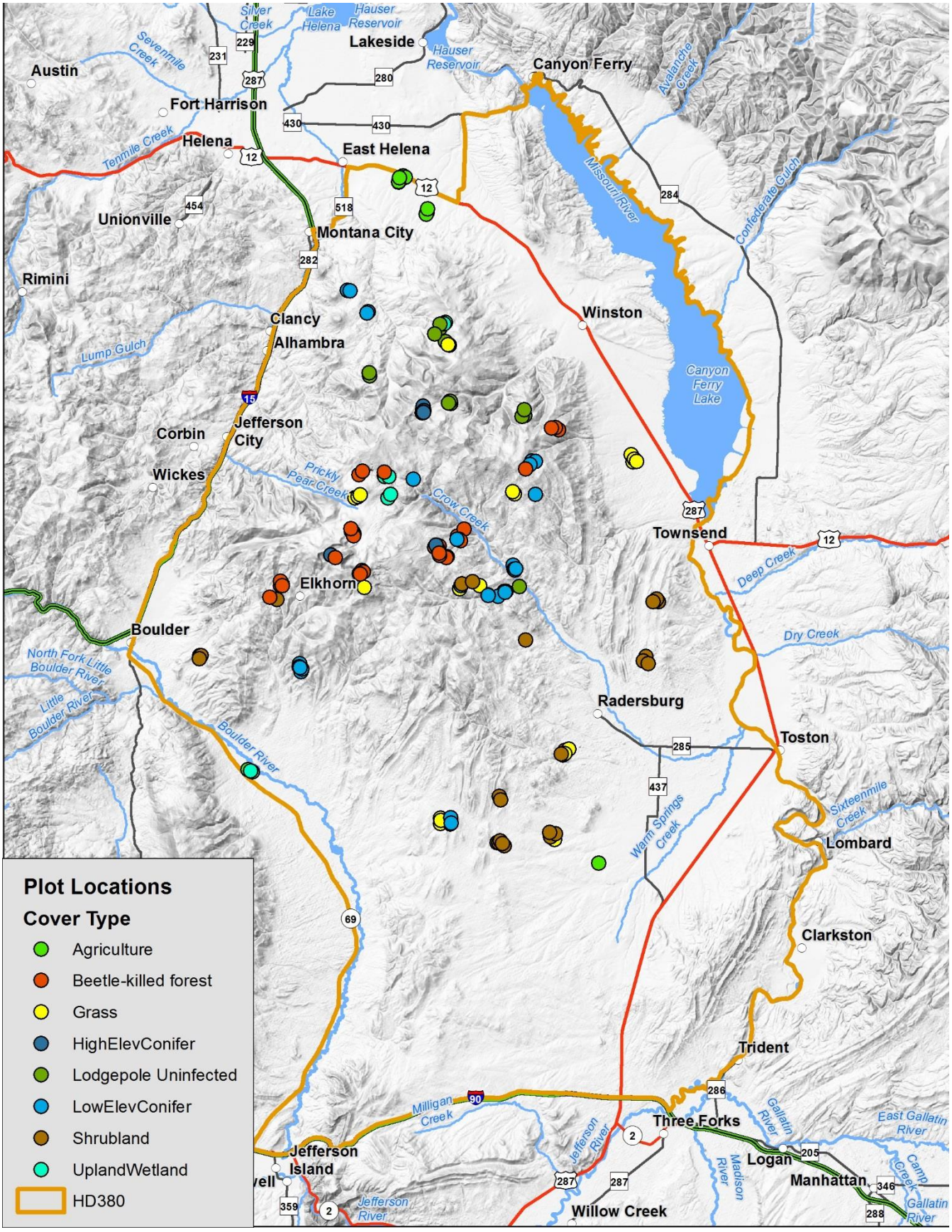

Figure 1. Locations of 158 vegetation plots sampled during the summer 2016 field season color-coded to represent the landcover type at the plot.

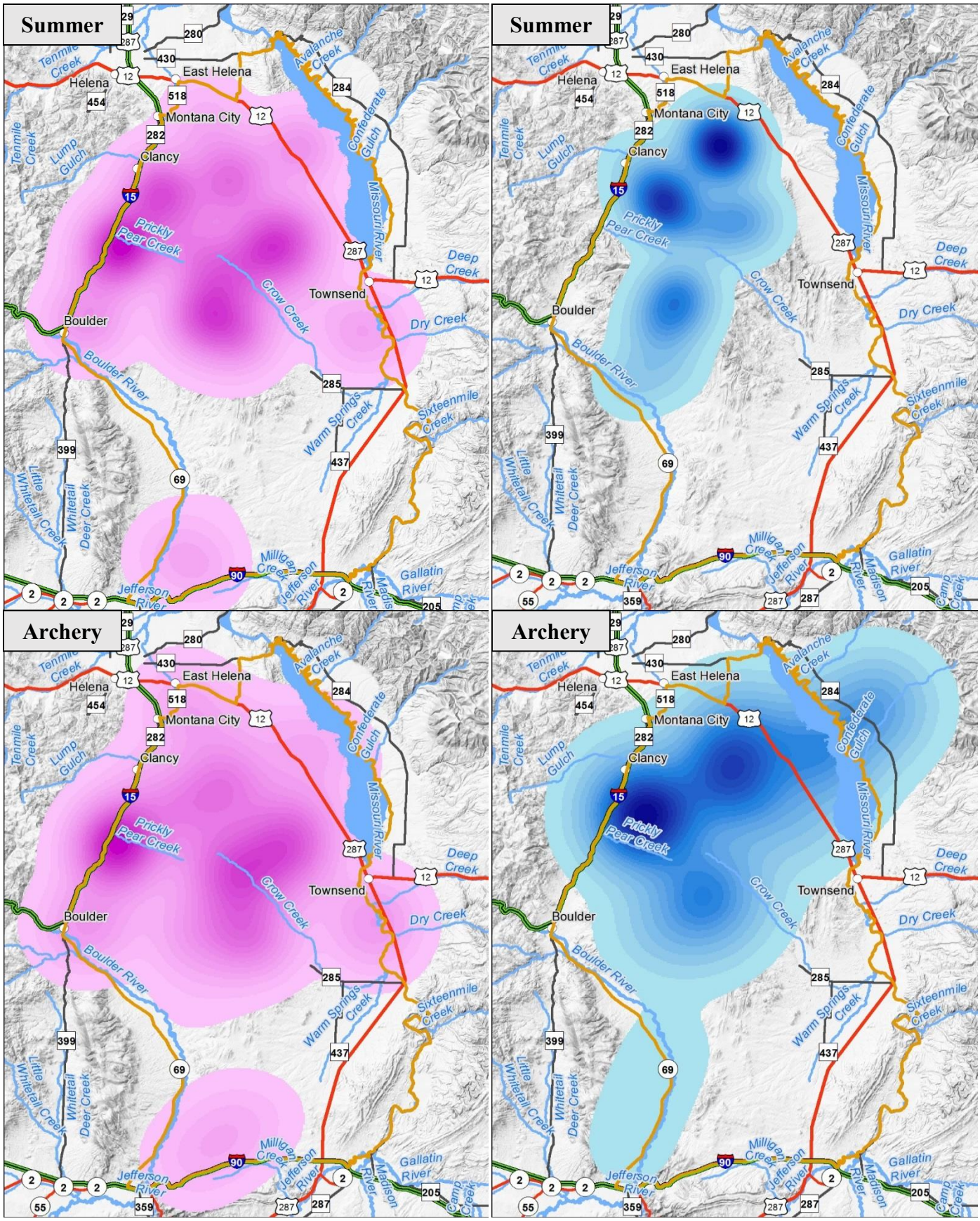

Figure 2. Female (pink) and male (blue) elk distributions during summer (top panels, July 1 – Sept. 1, 2016) and archery season (bottom panels, Sept. 1 – Oct. 15, 2016).

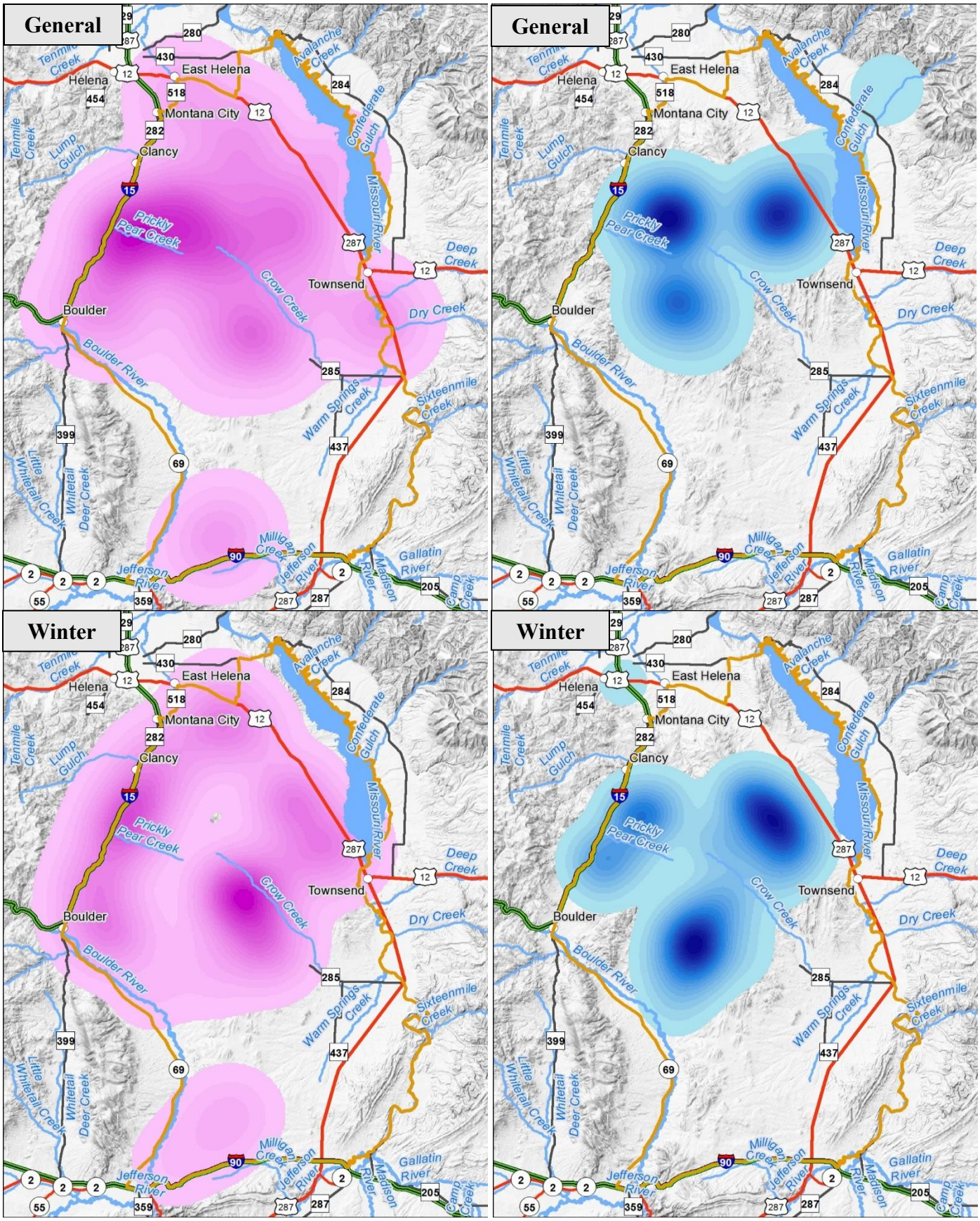

Figure 3. Female (pink) and male (blue) elk distributions during general rifle hunting season (top panels, Oct. 20 – Dec. 1, 2016) and winter (bottom panels, Dec. 1 – March 1, 2016).